

In-Service and Preservice EFL Teachers' Self-Perceived TPCK: The Seventh Construct of TPACK Framework

Dzurrotul A'yun Rofaida

rofaida149@gmail.com

English Education of STKIP PGRI Jombang

Abstract

In recent decades, the shape of technology integration in education has been changing. Technology, Pedagogy, and Content Knowledge (TPACK) framework was proposed as the theoretical umbrella for the current education which includes technology literacy. The purpose of this study is to investigate the difference between in-service and pre-service EFL teachers' self-perceived TPCK, the seventh construct of TPACK framework. This study took the form of sample survey using mailed questionnaire made with Google Form in Linear scale question format. The statements used four points Likert scale, also called Forced Likert. The Preservice teachers were taken from STKIP PGRI Jombang English Education Undergraduate Program and In-service teachers were EFL teachers Secondary Schools in Jombang. From 72 respondents (50 Preservice and 22 In-service), only 63 respondents (45 Preservice and 18 In-service) were analysed statistically using SPSS 20. Since, the result of Independent t-Test is $t_{61} = -0.219$ with $p\text{-value} = 0.827 (>0.05)$, it showed there is no significant difference in TPCK between In-service and Preservice teachers. The result of this study is against the results of Luik *et al.* (2018) study, but is close to Turgut's (2017b). For the next research, it would be more preferable to actually measure the participants' TPCK (or TPACK for a more complete research).

Abstrak

Dalam beberapa dekade terakhir, bentuk integrasi teknologi dalam pendidikan telah berubah. Kerangka Teknologi, Pedagogi, dan Pengetahuan Konten (TPACK) diusulkan sebagai payung teoritis untuk pendidikan saat ini yang mencakup literasi teknologi. Tujuan dari penelitian ini adalah untuk mengetahui perbedaan antara persepsi diri TPCK guru Bahasa Inggris dalam jabatan (Daljab) dan prajabatan (Prajab), konstruk ketujuh kerangka TPACK. Penelitian ini berbentuk survei sampel menggunakan kuesioner yang dikirim melalui Google Form dalam skala Linear format pertanyaan. Pernyataan-pernyataan tersebut menggunakan skala Likert empat poin, yang disebut juga Forced Likert. Guru Prajab diambil dari Program Sarjana Pendidikan Bahasa Inggris STKIP PGRI Jombang dan guru Daljab adalah guru Bahasa Inggris Sekolah Menengah di Jombang. Dari 72 responden (50 Prajab dan 22 Daljab), hanya 63 responden (45 Prajab dan 18 Daljab) yang dianalisis secara statistik menggunakan SPSS 20. Karena, hasil Independent t-Test adalah $t_{61} = -0,219$ dengan $p\text{-value} = 0,827 (>0,05)$, hal ini menunjukkan tidak ada perbedaan TPCK yang signifikan antara guru Daljab dan Prajab. Hasil penelitian ini bertentangan dengan hasil penelitian Luik *et al.* (2018) studi, tetapi dekat dengan Turgut (2017b). Untuk penelitian selanjutnya sebaiknya benar-benar mengukur TPCK peserta (atau TPACK untuk penelitian yang lebih lengkap).

Keywords: *EFL, In-service, Preservice, TPACK Framework, TPCK Construct.*

Introduction

Along with the development of technology, the shape of technology integration in education changed from information transmission oriented to learning facilitation technology. Many websites and application that boost fun and easy learning for many kinds of subjects began to appear one after another. To teach students who can be categorized as millennial (Howe & Strauss, 2000) or what we often call generation Z, teachers need to learn about technology to bring lessons that match their students' condition and need. Nowadays, it is not adequately accepted when teachers only have a good level of pedagogical and content

knowledge for a subject (Luik, Taimalu, & Suviste, 2018b). Then, suddenly, the growth of need on educational technology usage has gone to the roof because of Covid-19 pandemic. To prevent contamination among children, many countries including Indonesia have issued education-from-home which can only be realized through online means. Now, every teacher is obliged to have appropriate educational technology literacy. There is a framework which has become a hot topic among educational researchers as a measurement of this era's teacher's knowledge, it is Technology, Pedagogy, and Content Knowledge (TPACK).

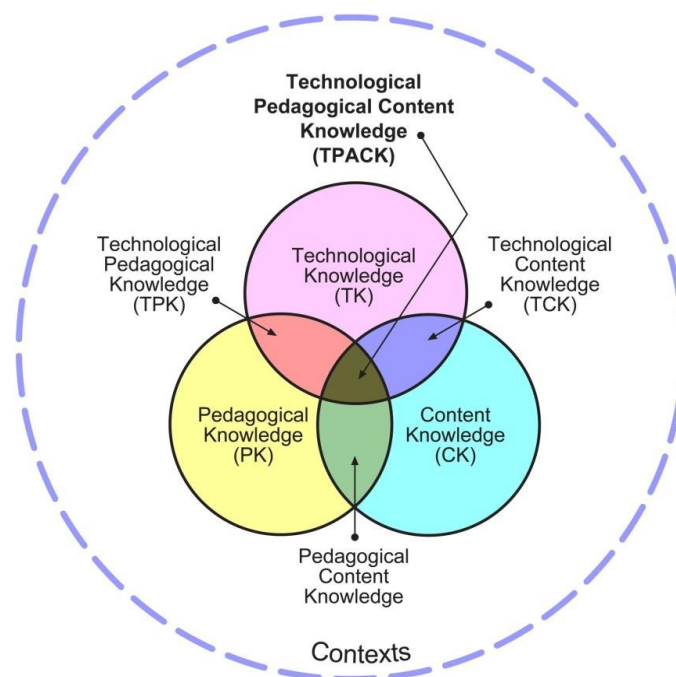
The knowledge about using educational technology effectively has become an important aspect of the educational base of educators for the 21st century (Cetin-Berber & Erdem, 2015). Unfortunately, the ability to integrate Information and Communication Technology (ICT) into teaching and learning continues to be a challenging task for many teachers (Shafer, 2010; So & Kim, 2009). Around the globe, teachers are reported to have been using ICT infrequently and when used, it is for information transmission rather than the supposed engaging and inquiry inducing purpose (Gao *et al.*, 2009; Harris *et al.*, 2009). Some teachers believe that is what it means to use technology for education, thus after they were explained about TPACK, they realized they have been assuming their technology integration ability to be higher than how it really was (Harris *et al.*, 2009). As for Preservice teachers, they are demanded upon graduated to be ready to teach in a way that match the current need, which means they have to have the sufficient TPACK to achieve it. One primary way that teacher educators can help Preservice teachers develop their TPACK is through focused work in an educational technology course (Hofer & Grandgenett, 2012). What makes teacher education (TE) program then and now so different is that TE program of 'now' is either technologically integrated or has a technology focused subject implemented.

Meaningful use of ICT in the classroom requires teachers to integrate technological affordances with pedagogical approaches for the specific subject matter to be taught (Jonassen *et al.*, 2008 in Turgut, 2017a). Teachers need to know which technology will bring what kind of support, or hindrance, in doing the strategy s/he chose for a certain subject matter. It is crucial for both in-service teachers and preservice teachers to keep up with this demand. In-service teachers need to be able to recognise their professional development (PD) needs by "constantly questioning, reflecting upon, and looking for ways to improve their instructional practices" (Mingucci, 1999 in Rochsantiningasih, 2005). Teacher Education Institutions (TEI) need to reform the curriculum to be more technologically integrated to produce more competitive graduates. In recent years, scholars and teacher educators are beginning to discuss and implement TPACK framework into TE curriculum (e.g. Ottenbreit-

Leftwich *et al.*, 2010; Cahyono *et al.*, 2016) and TPD program (e.g. Harris, 2008; Doering *et al.*, 2009).

Among numerous researches and studies conducted on TPACK, there were only few of them targeting both In-service and Preservice EFL teachers at the same time. Among similar studies found, the gap with this study is not only at the design, but also participants and place. When this study was proposed, the author still could not find any research comparing In-service and Preservice EFL teachers TPACK in Indonesian context. Though, this study did not measure all seven constructs of TPACK framework but only the last construct, which is referred as TPCK to avoid confusion.

All this time, when talking about the definitions and domains of the constructs, scholars and researches depicted the meaning of TPACK as the intersection of all other knowledge constructs in the framework. However, when measuring TPACK, all seven constructs is measured because, as the intersection knowledge domain, the extent of TPACK a teacher has is the result of the connection between and among the other six constructs. Thus, the term TPACK can refer to both the intersection construct and the whole framework itself. Nevertheless, this time, only the intersection construct will be measured. Although the definition of TPACK by Koehler & Mishra (2009) will be used as the guideline in building the questionnaire, the other six constructs will not be measured. So to avoid the intersection construct and the whole framework getting jumbled because the term used is the same, in this study the construct being measured will be referred as TPCK.



Picture 1. updated TPACK diagram based on Koehler & Mishra (2009)

The purpose of this study is to investigate the difference between in-service and pre-service EFL teachers' TPCK. As mentioned above, some teachers have misinterpreted the practical meaning of integrating technology into education. This study hoped to help improve the understanding of EFL teachers towards technology integration in education according to TPACK framework. For the respondents, this survey also gave a chance to look at themselves and reconsider their current ability, and then determine which skill or knowledge they should gain next as part of their self-improvisation. For the institutions they affiliated to, the growth of the In-service and Preservice teachers itself is a benefit for them, as they can have a better human resources.

Methodology

Among seven constructs (PK, CK, TK, PCK, PTK, TCK, and TPCK) of TPACK framework, TPCK construct was chosen to represent the framework because the definition of TPCK construct (according to Koehler & Mishra, 2009) is the intersection of all other constructs. This study asked the respondents to self-assess their TPCK. By choosing survey as the method, this study intended to find differences in TPCK between two groups who finished education in different era and have different amount of teaching experience without aiming to make clear the causal effect between the difference in education and teaching experience and the difference in TPCK.

The population of Preservice teachers were those enlisted in STKIP PGRI Jombang (TEI of Jombang) English Education Undergraduate Program and had taken PLP (Teaching Practicum). The population of In-service teachers was EFL teachers of Secondary Schools, both Junior and Senior level, in Jombang. The sampling of both population was done through convenience sampling by taking volunteers to participate in this survey research. From 72 respondents (50 Preservice and 22 In-service), five out of them are the tester of the questionnaire and four others were considered invalid for not fulfilling the criteria. Thus, only 63 respondents (45 Preservice and 18 In-service) were compared statistically using SPSS 20.

The questionnaire used this time had gone through series of procedure in devising its statements. First, key-points were outlined according to description of TPCK construct by Koehler & Mishra (2009). Then, indicators of TPCK construct from Malik (2019) and Farikah & Al Firdaus (2020) questionnaires were filtered through and adjusted to suit these key-points. Third, other than adapted indicators, other additional indicators were added to cover areas which are yet covered by adapted indicators. Lastly, these indicators were represented through statements for TPCK measurement. This study's questionnaire used four

points Likert scale, also called Forced Likert, a combination of Likert scale and forced rating scale. Unlike typical Likert scale which has odd points (commonly five), even points Likert scale has no middle or neutral point. This questionnaire's statements only had two options of extreme ends and two intermediate options in between them.

The questionnaire was made using Google Form in Linear scale question format, as the one redeemed most suitable to present Likert scale statements (Picture 2). The value was set from 1 to 4 and both the lowest and highest values were labelled to inform the participants the degree of knowledge demanded by each value. The statements were divided into five sections according to the key-points. Each sections begun with the Indonesian translation of the key-point which is the topic of that section. The statements used Indonesian instead of English to raise the number of volunteer.

Keypoint 1

Pemahaman tentang representasi konsep menggunakan Teknologi

1.a. Saya tahu kemudahan dalam menyajikan konsep materi menggunakan IT dibandingkan tanpa menggunakan IT *

1 2 3 4

Tidak Tahu Tahu Sepenuhnya

Picture 2. Example of statements in Google Form

The TPCK score is the mean score of the five key-points. Since key-points each had multiple indicators, mean score of these indicators served as the score of corresponding key-point. For indicators with multiple statements, mean score of these statements served as the score of corresponding indicators.

Result

From calling out to the volunteers, a total of 63 data were gathered. There are 18 In-service teachers, 14 from Junior and 4 from Senior Secondary Schools. For Preservice teachers, there are 22 from academic year of 2017 and 23 from academic year of 2018. Participants' TPCK score is as listed in table 1 and 2. The column "Code" is a replacement for numbers and names of the participants to simplify the tables.

Table 1. In-service teachers' TPCK scores

Code	TPCK	Code	TPCK	Code	TPCK	Code	TPCK	Code	TPCK
I-1	3.16	I-5	2.76	I-9	1.59	I-13	3.26	I-16	2.63
I-2	2.48	I-6	3.98	I-10	3.34	I-14	3.44	I-17	2.61
I-3	3.02	I-7	2.22	I-11	3.22	I-15	2.88	I-18	3.10
I-4	2.87	I-8	2.87	I-12	3.05				

Table 2. Preservice teachers' TPCK scores

Code	TPCK	Code	TPCK	Code	TPCK	Code	TPCK	Code	TPCK
P-1	2.56	P-10	2.42	P-19	3.20	P-28	2.85	P-37	2.93
P-2	2.46	P-11	1.99	P-20	3.11	P-29	3.00	P-38	3.10
P-3	2.97	P-12	3.03	P-21	3.03	P-30	3.53	P-39	2.54
P-4	3.07	P-13	3.39	P-22	3.00	P-31	3.51	P-40	2.93
P-5	2.65	P-14	3.33	P-23	2.97	P-32	2.85	P-41	2.94
P-6	2.62	P-15	2.59	P-24	3.21	P-33	2.87	P-42	2.83
P-7	2.95	P-16	3.79	P-25	3.63	P-34	3.62	P-43	3.00
P-8	3.13	P-17	3.62	P-26	3.06	P-35	3.00	P-44	2.23
P-9	2.91	P-18	2.49	P-27	2.13	P-36	3.26	P-45	2.13

First, the data distribution was tested to see its normality. Table 4.3 shows both Kolmogorov-Smirnov and Shapiro-Wilk tests' results. Since the current survey respondents are less than a hundred, Shapiro-Wilk test results is the one being used this time. Both In-service ($p=0.535$) and Preservice ($p=0.296$) test results show normal data distribution ($p>0.05$). With this, Independent T-test can be used to compare TPCK scores of both groups.

Table 4.3 Normality Test Result

Groups	Kolmogorov-Smirnov ^a		Shapiro-Wilk	
	df	Sig.	df	Sig.
In-service	18	.200	18	.535
Preservice	45	.069	45	.296

From conducting Independent T-test, first, Group Statistics (Table 4.4) shows some information regarding the groups of data being compared. N shows that the number of data for In-service is 18 and Preservice 45 which is the same with the number presented in previous subchapter (A. Data Display). This means the there is no mistake in data input since no data is missing or doubled. "Mean" shows the mean score of TPCK for each group. The mean score of TPCK of In-service Teachers is 2.9156 and Preservice teachers' is 2.9429.

Table 4.4 Group Statistics

Groups	N	Mean	Std. Deviation	Std. Error Mean
In-service	18	2.9156	.51777	.12204
Preservice	45	2.9429	.41609	.06203

Table 4.5 shows the results of Levene’s test for equality of variances, a homogeneity test to measure difference in variances of TPCK score between the two groups, and t-test for equality of means which is the result of the actual Independent T-test.

Table 4.5 Homogeneity Test and Independent T-test

Levene's Test for Equality of Variances		t-test for Equality of Means				
F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
.549	.462	-.219	61	.827	-.02733	.12459
		-.200	26.241	.843	-.02733	.13690

The *p*-value of Lavene’s test is 0.462 (>0.05), means that the variances of TPCK scores of the two groups are homogeny. This means for the result of t-test, we should look at the upper row (equal variances assumed). Therefore, $t_{61}=-0.219$, with *p*-value =0.827, means that the null hypothesis is retained.

The result of data analysis has retained the null hypothesis means that there is no significant difference in TPCK score between In-service and Preservice. With the mean score of In-service Teachers being 2.9156 and Preservice teachers being 2.9429, it was clear that Preservice teachers scored only slightly higher than In-service teachers. The difference of mean score between the groups is only 0.02733.

Discussion

The current study had hypothesised that In-service teachers would be significantly higher than Preservice in TPCK, much like how it was with Luik *et al.* (2018a) study. Due to the fact that In-service teachers TPCK turned out to be barely as high as Preservice teachers (Preservice were higher by 0.02733), the result of this study is similar with Turgut (2017b) quantitative study, where preservice teachers only slightly higher than In-service on TPCK construct. Since Turgut (2017b) study’s definition of In-service and Preservice teachers resembled this study and both Turkey and Indonesia teach English in EFL context, the resemblance in result seems foreseeable at first look. However, it should have not been the case since this study was conducted after online education had become the only option for almost two years.

Before the pandemic, level of technology integration in Indonesian schools is still low because many In-service teachers are still struggling in technology-based teaching (Prasojo *et al.*, 2019 and 2020). Just like how it is in Turkey (Turgut, 2017b) and other countries (Gao *et al.*, 2009; Harris *et al.*, 2009). Nevertheless, when the education was obliged to be done through long distance means, online education as number one option should have urged the

In-service teachers to learn the proper way of using educational technology in a hurry. Now, after the In-service teachers have been doing online education for quite some time, the author had expected them to know and have the ability to use education related ICT fairly well.

As stated in Elucidation of UU RI (Indonesian Law) Act No. 14 Year 2005 Article 20 subsection b, one of teachers' obligations in carrying out professional duties is improving and developing academic qualifications and competencies on an ongoing basis in line with the development of science, *technology*, and art. With how online education had pushed the need for technology literacy and how the technology will continue to develop from now on, there is no reason to not do self-improvement in handling educational technology. Despite that, the data showed that the In-service teachers scored one step behind the upper range (2.9156) and was on par with the Preservice (2.9429). Since the respondents of this study had self-perceived their TPCK, there is always the possibility of participants under- or over-assessing themselves (Hofer and Grandgenett, 2012), thus, data from other sources are needed to get a solid actual result. But, it can also be said that In-service self-perceived TPCK this time showed that the In-service teachers *believed* they can only do so much. Whether this was caused by the In-service low self-confidence in TPCK or their ability was truly just amount to that, either way, something need to be done to improve this situation.

This means there is a need for a Teacher's Professional Development (TPD) program which uses the correct depiction of technology implementation in education and has a suitable format to build teachers' knowledge and ability. Unfortunately, such a PD program is not something easily accessible to the teachers. Rochsantiningsih (2005) had reported that general trend of TPD in Indonesia is where teachers are one-sidedly receiving information and not involved in the design and preparation. The PD program typically uses big size classrooms which is ineffective for intensive drill. This case is not something only happened in Indonesia. Turgut (2017b) qualitative study reported that technology integration in schools wasn't at expected level, despite the fact that the teachers had received technology training organized by Ministry of National Education of Turkey. From the teachers' interview, it turned out that trainings are conducted often as seminars (rather than hands-on activities and practices), short term and off-site. A major reformation in PD program format is needed to truly help the teachers to improve themselves. Implementing TPACK framework into a project or practice based PD program might just be the answer.

Cahyono *et al.* (2016) had tested a TPACK-oriented teaching practice course with smaller classroom (20 In-service) in introducing TPACK framework and implementing it in instructional designs. Through 16 intensive meetings/sessions, the results showed that more

teachers included TK in their instructional designs after the introduction of TPACK. The only short-coming of the course is that there was no session for the participants to actually use what they learnt to real students under the supervision of the mentor. This result is in line with Doering *et al.* (2009) study which reported that giving the teachers the chance to actually use what they learnt from TPD program in their own class requires the support from the TPD committee or tutor. The reason is the teachers was hoping for an acknowledgement from the one who had given them their new knowledge that they actually use what they learnt.

Adding to the explanation of the importance of TPACK and real-time practice in TPD program, the current system of Educator Certification (also referred to as PPG or TPE) in Indonesia serves as an example for intensive project and practice based TPD program with small classroom. In this program, participants will be trained in making a HOTS-oriented teaching set using TPACK approach with ICT as the learning sources. After a comprehension test following the training session, participants will have to apply what they learn in an actual class in their respective schools under the supervision of their TPE Instructor and Mentor Teacher. Only after that that the participants will be assessed on four competencies in knowledge and performance to get an Educator Certificate.

However, since Educator Certification or PPG program uses small classroom and only a relatively small number of teachers from across the country can participate, there is a need for more PD program with similar format. With the example set by Cahyono *et al.* (2016), Doering *et al.* (2009), and Indonesian government, the author hoped for more PD programs which use TPACK based approach and where the participants can engage in projects or practices in real class.

Conclusion

The result shows that there is no significant difference in TPCK score between In-service and Preservice teachers. There could be several reasons behind this result, however this study only compare TPCK score of the two groups without purposely looking for the reason behind the result of the comparison. However, it is definite that further development in designing teachers' PD program that can fulfil teachers' need in educational technology literacy improvement. Some examples have been mentioned in the Discussion with hope those can be reference in devising PD program or master degree teaching practice course.

Suggestion

The measurement this time used self-assessment of the participants as the source of data. Thus, it cannot be said that the results reflect the condition in reality. There are many bias in the participants' answers, like self-confidence, modesty, and assumption towards the study itself. Therefore, for the next research, it would be more preferable to actually measure the participants' TPCK (or TPACK for a more complete research). Especially, if it is about Preservice teachers, measuring their ability can serve as a sort assessment to help monitor their growth across their four-years in TE program.

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